

Discovery of Two New Species and Genera of Shaggy Tortricids Related to *Synnoma* and *Niasoma* (Tortricidae: Sparganothini)

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The monotypic genera *Synnoma* (Walsingham, 1879) and *Niasoma* (Busck, 1940) are represented by two of the most unusual species in North American Tortricinae. *Synnoma* displays structural characters, particularly in male genitalia, that appear to associate it unequivocally with Sparganothini; but *Niasoma* has remained enigmatic and has been accorded independent tribal status, primarily for lack of convincing evidence as to its relationships (Powell, 1983). Hence, the discoveries in recent years of the larva of *Niasoma*, together with two previously undescribed species that show similarities to the two described, aberrant genera, have considerable relevance to our understanding of systematic relationships in this group.

Synnoma lynosyrana, which was originally described from northern California and occurs widely in arid regions of the western U.S., is a highly modified species. The diurnal moths emerge in late fall and are sexually dimorphic; the females are flightless. The adults possess a rudimentary tongue and apparently do not feed; females deposit imbricate masses of eggs typical of the tribe Sparganothini but cover them with a black colleterial substance unlike any other known in the subfamily. The larvae feed colonially from tough silken webs on *Gutierrezia* and *Chrysothamnus* (Asteraceae) (Powell, 1976).

Niasoma metallicana (Walsingham, 1895) was described from Florida and occurs in the Gulf States, but it has remained poorly known. The species was first reared in 1982, affording the opportunity to compare relationships based on larval characters. Adults of *Niasoma* possess thick vestiture on the body and rows of upraised scales on the forewings, rendering a shaggy appearance similar to that of *Synnoma* (Powell, 1976, figs.), much of which is lost from flown individuals. *N. metallicana* is particularly remarkable in this respect; reared specimens have erect bunches of scales up to 1.5 mm in length protruding at right angles to the plane of the forewing. Previously examined specimens in collections have only traces of the erect scaling, having lost most of it either in flight or handling. Adults of the two new species described below show similar traces of

upraised scaling and presumably have a ruffled appearance when freshly emerged.

Neither *Niasoma* nor the new genera display sexual dimorphism as strongly as does *Synnoma*, but *N. metallicana* and *Synalocha gutierreziae*, n. sp., have two color phases in both sexes. Both these species are multivoltine, a further parallel as contrasted with *Synnoma*.

Synalocha Powell, new genus

Type species.—*Synalocha gutierreziae* Powell, new species.

Adult.—**Head:** Antenna in male thickened, serrate, with elongate setulae (fig. 2); simple with minute setulae in female; dorsal scaling in a single band per segment. Labial palpus elongate, II segment only slightly curved, enlarged 2 X at basal $\frac{1}{3}$; III segment straight, $\frac{1}{2}$ as long as II (fig. 3). Maxillary palpus rudimentary, no differentiated segments. Ocelli and chaetosema well developed. **Thorax:** Tarsal segments without enlarged bristles. Forewing moderately narrow, slightly broader in the larger female. No costal fold in male. Chorda absent; stem of M in cell weak, with remaining trace ending at M_2 ; Cu_2 present; R_4 and R_5 stalked, R_4 to costa, R_5 to termen; M_3 and Cu_{1a} separate. Upraised rows of scales in transverse pattern. Hindwing with 9 veins to margin; humeral vein absent; Sc + R and Rs stalked; R_5 and M_1 closely approximate; M_3 and Cu_1 closely adjacent; 1A a trace. No costal hair tuft in male. Cu with hair pecten. **Abdomen:** Dorsal pits absent. Male without coremata. Female with moderately enlarged corethrogyne scaling. Male genitalia (fig. 6): Uncus short, tapered, curved, strongly sclerotized. Saccus undifferentiated, lateral arms of vinculum joined by membrane. Socii buttonlike, flat, oval, setate, unscaled. Gnathos arms separate, spinulose. Transtilla moderately broad, serrate, separate from pulvinus. Valva simple, pulvinus weak; sacculus and costal rim sclerotized, narrow rims. Aedeagus strongly curved from short phallobase, flared distally, with a blunt external spur; vesica with 6 elongate cornuti (presumed deciduous). Female genitalia (fig. 9): Papillae anales narrow, slightly enlarged anteriorly and posteriorly, without specialized setae. Sterigma a wide, simple bowl, with deep, enlarged antrum subtending. Ductus bursae without colliculum or accessory sac, thickened basally and longitudinally with parallel ribs; corpus bursae well differentiated, without accessory pouch or scobination; signum thornshaped without capitulum.

Final instar larva.—Sharing Sparganothini characters as defined by MacKay (1962:29). **Head:** Ocelli (stemmata) I, II, and VI subequal to or slightly larger than III-V. Adfrontals narrow basally, broader posteriorly, the sutures sinuate. **Thorax:** D and SD pinacula on meso- and metathorax not or only slightly elongated posteriorly. SV group on meso- and metathorax with a single seta. **Abdomen:** SV group on A1, 2, 7, 8, 9 with 3, 3, 3, 2, 2 setae; SD_1 on A8 directly anterior to spiracle; D_1 's of anal shield anterior to and about as far apart as each is from its corresponding SD_1 ; L_3 on A9 occasionally lacking. Anal shield distinctly triangulate posteriorly, strongly sclerotized laterally; anal fork well developed. Spiracles small, those of A3-7 ca 0.04-0.05 mm in diameter, A8 ca 0.12 mm. Crotchets variably biordinal, 42-48 on abdominal, 38-40 on anal proleg.

This genus is most similar and presumably closely related to *Synnoma*

Walsingham, although differing in several aspects of the genitalia. *Synalocha* is aberrant compared to other Sparganothini, with reduced socii, separated vinculum anteriorly and flared aedeagus. In the female, the enlarged, sclerotized antrum, reminiscent of *Acleris* (Tortricini), is unique among Sparganothini.

***Synalocha gutierreziae* Powell, new species**

Male.—Length of forewing 6.5-7.9 mm (lab reared). **Head:** Antenna enlarged,

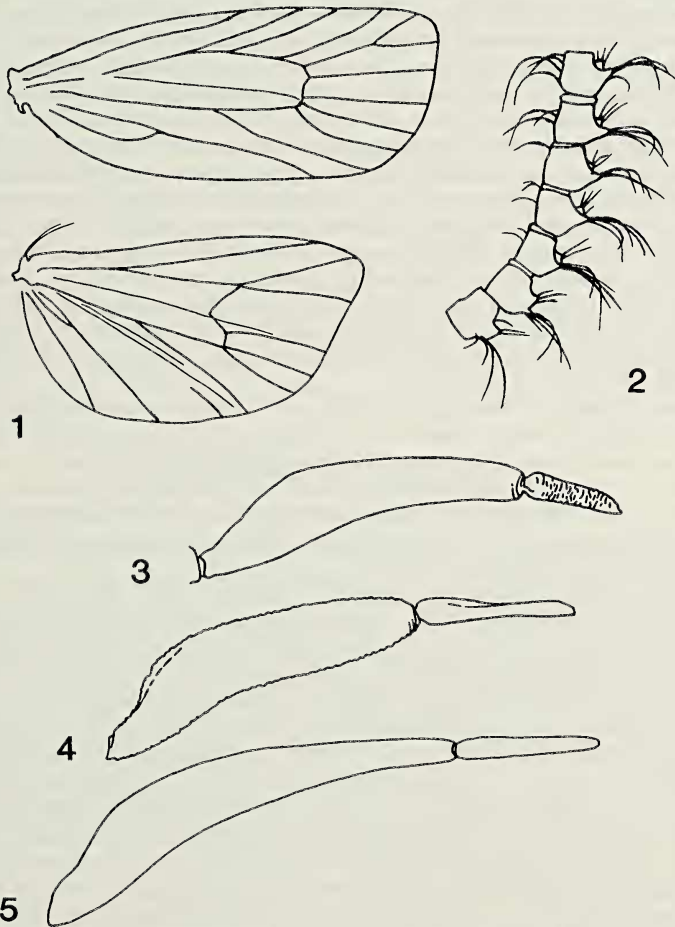


Fig. 1. Wing venation of *Syllonoma longipalpana* Powell.

Fig. 2. Antennal segments of *Synalocha gutierreziae* Powell.

Figs. 3-5. Labial palpi, segments II-III: 3, *Synnoma lynosyrana* (Wlsm.); 4, *Synalocha gutierreziae*; 5, *Syllonoma longipalpana*.

strongly serrate with elongate whorls of setulae ($1.6 \times$ segment width) on ventral half (fig. 2), width of basal segments ca 0.23 eye diameter. Labial palpus elongate, II segment broadened at basal $\frac{1}{3}$, length 2.10-2.25 \times eye diameter; III 0.47-0.55 as long as II; scaling moderately spreading, dark gray-brown with a few pale red-brown scales intermixed. Tongue short, probably functionless. Crown with very short postantennal spurs; scaling dark brown intermixed with pale brown, especially towards occipital tufts, overhanging to labial palpi, obscuring front. **Thorax:** Dorsal scaling entirely pale tan to mostly dark brown with pale tan tegulae. Underside and legs pale tan tinged with brownish to dark brown tinged with blackish, tarsal segments with pale apical bands. **Forewing:** Moderately narrow, length 2.7 to 2.8 times width; costa nearly straight, slightly bowed near base, apex blunt, termen nearly straight, dorsal margin strongly curved near base. Scaling shining, pale tan, with a faint to moderately well defined pattern of pale reddish brown, emphasized by scattered, slightly upraised darker scales, blackish in darker specimens: costa at base, a suggestion of a basal band usually indicated by slightly raised tufts in cell; a transverse band from mid-costa outwardly oblique through outer part of cell to dorsal margin before tornus; an outer costal spot before apex extending to R_{4+5} stem; an ill-defined marginal line at base of fringe, which is pale tan even on dark specimens. Underside dark brown with pale tan margins crossed by dark strigulae in darker specimens. **Hindwing:** Apex rather acute, termen shallowly emarginate. Dorsal scaling dark gray-brown, only slightly paler in specimens having pale thoracic and forewing scaling. Fringe pale tan. Underside similar, paler. **Abdomen:** Tan to dark brownish gray, each segment with posterior pale scale bands; underside similar. Genitalia as in fig. 6 (drawn from paratype, Jal, NM, JAP prep. no. 4978, 4n).

Female.—Length of forewing 6.5 to 10.5 mm. Generally as described for male; forewing slightly broader, length 2.6-2.7 times width. Similar to male in color variation, usually paler, dark form with blackish body and hindwing scaling rare in females (5 of 19 specimens), hindwing usually pale gray-brown. Abdomen with enlarged dorsal and lateral scale tufts forming a hood over papillae anales, dark brown tinged with purplish. Genitalia as in fig. 9 (drawn from paratype, 10 mi E Ft. Stockton, TX, JAP prep. no. 4457, 4n).

Holotype male.—TEXAS: 5 miles north of Monahans, Ward Co. 4 July 1979, reared from silk webbing on *Xanthocephalum sarothrae* (J. K. Wangberg coll. 057-01); allotype female, Texas: 2.5 miles E of Wink, Winkler Co., V-1980 "on perennial broomweed *Gutierrezia* spp." (B. R. McPherson coll. 043-04) deposited in Essig Museum of Entomology, U. California, Berkeley. Paratypes (23 males, 17 females): ARIZONA, 40 mi NE Clifton, Greenlee Co. ca 4500', 2 males, 1 female X-9-65, larvae webbing flowerheads of *Gutierrezia sarothrae* (B. Freeman). NEW MEXICO, Jal, Lea Co., 2 males, 2 females X-15-79 (B. R. McPherson). Roswell, Chaves Co., 1 female "Aug. 22" (T. D. A. Cockerell). TEXAS, same data as allotype, 3 males, 4 females (McPherson colls. 030-04, 043-04, 044-04); 10 mi W Wink, Winkler Co., 1 female VII-4-79, r.f. silk webbing on *Xanthocephalum sarothrae* (J. K. Wangberg coll. 059-01); same data as holotype, 1 male; 10 mi S Monahans, Ward Co., 1 male VII-5-79, r.f. silk webbing on *X. sarothrae* (Wangberg coll. 064-01); 10 mi E Ft. Stockton, Pecos Co., 1 male, 5 females IX-15-78, *X. sarothrae* (Wangberg coll. 046-01). "Brenster Co" [Brewster Co.], 7000 ft., 13 males, 3 females "5/26" (ex Meyrick Coll.). Paratypes deposited in collections of BM (NH); Texas Tech University, Lubbock; Essig Museum, U. California, Berkeley; and USNM. Additional specimens from Ft. Stockton in poor condition

were examined but not designated as paratypes.

Most of the New Mexico and Texas localities are situated along an 85-km north-south transect of the Pecos River Valley, a reflection of sampling effort by Dr. Wangberg and his associates. The record from extreme eastern Arizona indicates that *S. gutierreziae* is much more widespread. It is curious that there were no specimens in American collections prior to 1965. Those in the Meyrick collection had been misidentified as *Synnoma lynosyrana*; hence this distinctive species was overlooked.

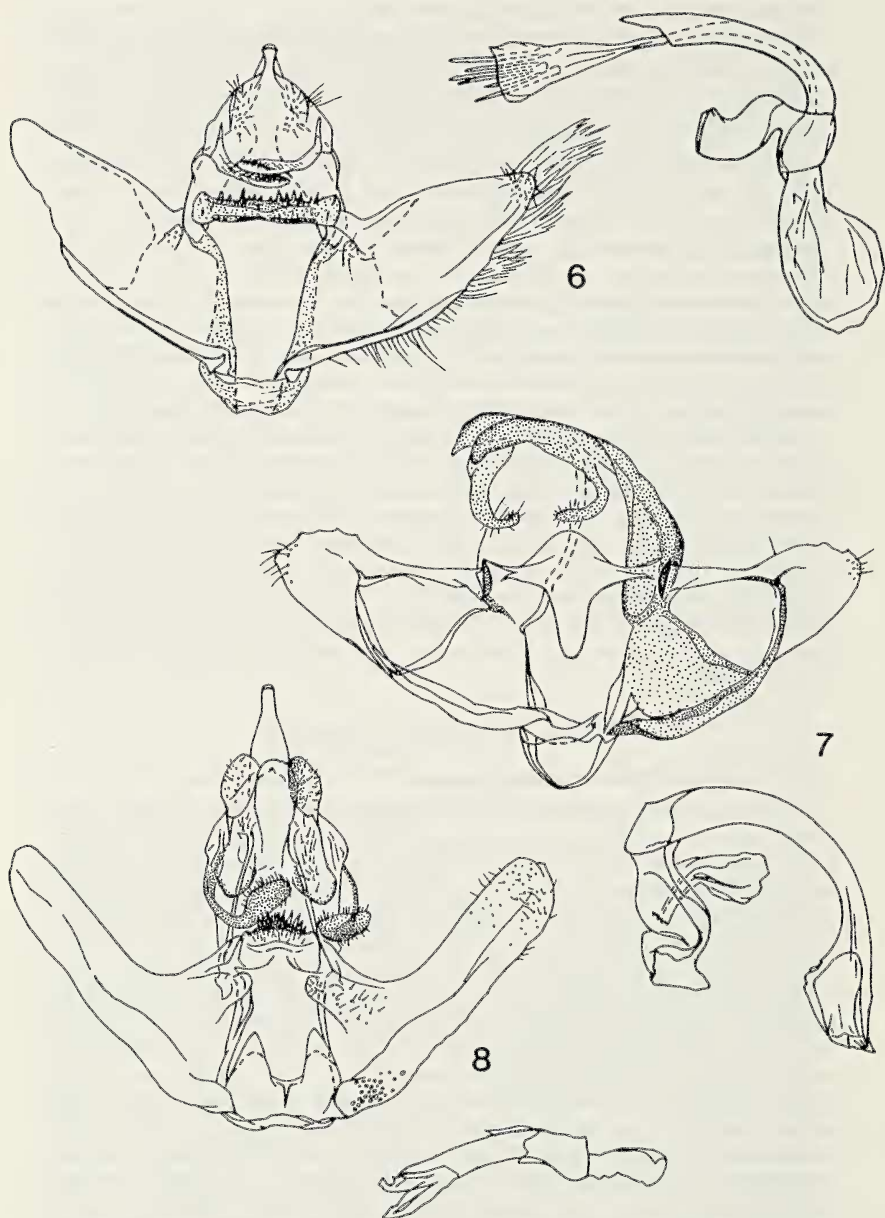
Biology.—All the recently collected specimens have been reared from larvae collected on *Gutierrezia sarothrae* or *G. microcephalum* (Asteraceae, Asteridae). Although some are labelled *Xanthocephalum* sp. or *X. sarothrae*, *Gutierrezia* is the valid generic assignment according to present concepts (Lane, 1984). *Synalocha gutierreziae* has been the subject of biological studies by J. K. Wangberg and D. R. Edwards of Texas Tech University for several years. They provided the following synopsis of the detailed study, which will be reported separately.

The species is multivoltine, in contrast to the univoltine *Synnoma lynosyrana*, adults of which emerge in October and November (Powell, 1976; Wangberg & Edwards in litt.). Males fly readily, while females appear to be too heavy to fly, as is true of *S. lynosyrana*. Dissections of unmated *S. gutierreziae* females revealed whitish material in the colleterial glands, in contrast to the black substance produced by *S. lynosyrana*. Wangberg and Edwards found that the eggs are green, deposited in rows along the upper surface of leaves; in the lab they are laid in patches, with scale tufts deposited at one end. There are 7 larval instars, and pupation occurs inside tied leaves, in a shelter that is not as strong as the tough webs of *S. lynosyrana*.

Syllonoma Powell, new genus

Type species.—*Syllonoma longipalpana* Powell, new species.

Head: Antenna serrate in male with long setulae (ca 1.0 segment width) in dense whorls from ventral half of enlarged segments; dorsal scaling in a single band from base; simple with minute setulae in female. Labial palpus slender, greatly elongate, II segment ca 4 × eye diameter, III ca 0.3 as long as II (fig. 4). Maxillary palpus apparently rudimentary. Ocelli and chaetosema well developed. **Thorax:** Tarsal segments without enlarged bristles. Forewing moderately broad. No costal fold in male. Wing venation as in fig. 1: Chorda absent; stem of M present in cell without trace of fork, ending at M_2 ; Cu_2 present; R_4 and R_5 stalked, R_4 to costa, R_5 to termen; M_3 and Cu_{1a} separate. Upraised scales in transverse rows. Hindwing with 9 veins to margin; humeral vein absent; Sc + R and Rs stalked, without cross-vein; R_5 and M_1 connate; M_3 and Cu_1 connate; 1st A present. No costal penicillus in male. Cubital hair pecten present, weak. **Abdomen:** Dorsal pits absent. Male without coremata; female apparently without corethrogyne scale tufts. Male genitalia (fig. 7): Uncus curved, strongly sclerotized, deeply cleft apically, without ventral hair tuft; saccus not differentiated; no subscaaphium and ham; apparently *socii* reduced to a few setae, gnathos arms separate, weakly sclerotized, setate; transtilla broad, with an elongate projection anteriorly, non-dentate; valva simple, sacculus a sclerotized ridge, attached across valva distally to the weakly sclerotized costal rim; pulvinus weak, no clasper; aedeagus elongate, evenly curved, strongly flared distally, vesica with 2 slender, deciduous cornuti, apparently



Figs. 6-8. Male genitalia, ventral aspect, valvae spread, aedeagus removed and shown in lateral aspect: 6, *Synalocha gutierreziae* Powell; 7, *Syllonoma longipalpana* Powell; 8, *Synnoma lynosyrana* (Wlsm.).

attached basally. Female genitalia (fig. 10): papillae anales narrow, slightly enlarged anteriorly, without floricomous setae; sterigma a shallow V-shaped ridge, sclerotized interiorly to antrum, subtended by a second, external V-shaped ridge; antrum enlarged but not sclerotized; ductus bursae membranous, gradually widened distally, without accessory sac; corpus bursae well differentiated, without accessory pouch, signum a single invaginated, slender horn.

Larva unknown.

The new genus is most similar and apparently closely related to *Synalocha*, which *S. longipalpana* resembles superficially, in wing venation and male genitalia, especially the form of the uncus, reduced socii, gnathos and aedeagus. *Syllonoma* differs markedly, however, in the transtilla form (which is almost exactly like that of the cnephasiine, *Decodes lundgreni* Powell) and the valva and sacculus, which are unlike those of any other Sparganothini. Female structures of the two genera are generally similar, although the sterigma and antrum form differ, and evidently *S. longipalpana* lacks corethrogyne scaling and correlated oviposition behavior.

Syllonoma longipalpana Powell, new species

A small, dark species with tan forewings with transverse dark brown bands in the male and weakly upraised scale ridges in both sexes. The long, slender palpi are unique among American Tortricinae.

Male.—Length of forewing 6.4 mm. **Head:** Labial palpus elongate, slender, II segment enlarged to $2 \times$ basal diameter near base, only slightly curved. Scaling appressed, brownish black with a few, scattered red-brown scales. Scaling of crown roughened, dark brown with scattered red-brown, concentrated medially. **Thorax:** Dorsal scaling concolorous with head. Underside and legs shining blackish brown. **Forewing:** Length 2.3 times width, rectangulate, costa nearly straight, termen gently curved, dorsal margin strongly curved near base. Ground color dark tan with scattered brown scales and 3 broad, dark brown, transverse bands (probably upraised in fresh specimens), first at base, second from costa outwardly angled to dorsal margin before tornus, and the third subapically towards termen above tornus; the latter two indistinct and coalesced toward tornal area; a thin brown line in apical area. Fringes lacking from holotype. Underside dark brown with tan areas of upperside indicated in costal area. Hindwing entirely dark brown, reflecting bluish. **Abdomen:** Color not recorded. Genitalia as in fig. 7 (drawn from holotype, JAP prep. no. 5051, one preparation examined).

Female.—Length of forewing 7.3 to 7.6 mm. Essentially as described for male except generally darker brown. Forewing brown, weakly showing transverse bands of male, with numerous parallel rows of upraised scales in both darker and paler transverse band areas. Genitalia as in fig. 10 (drawn from allotype, JAP prep. no. 5066, 2 preparations examined).

Holotype male and allotype female, SOUTH CAROLINA, Myrtle Beach, Horry Co., July 9, 1943 and August 14, 1943 (C. T. Parsons) deposited in MCZ. One female paratype, NORTH CAROLINA, Leland, Brunswick Co., June 17, 1946 (O. Buchholz) in ANSP.

Superficially this species resembles females of *Platynota idaeusalis*

(Walker), but apparently it has less pronounced sexual dimorphism, lacks the male costal fold, and has conspicuously longer labial palpi. The two localities, which are about 96 km apart, are coastal sites, and populations might be expected all along the southeast Atlantic Coast.

It is strange that more specimens have not been discovered. None was represented in material accumulated by R. L. Lambert during his revisionary work on the Sparganothini, nor were there any in the extensive Florida collections of C. P. Kimball examined at MCZ in 1982, where the types were discovered in other unsorted material.

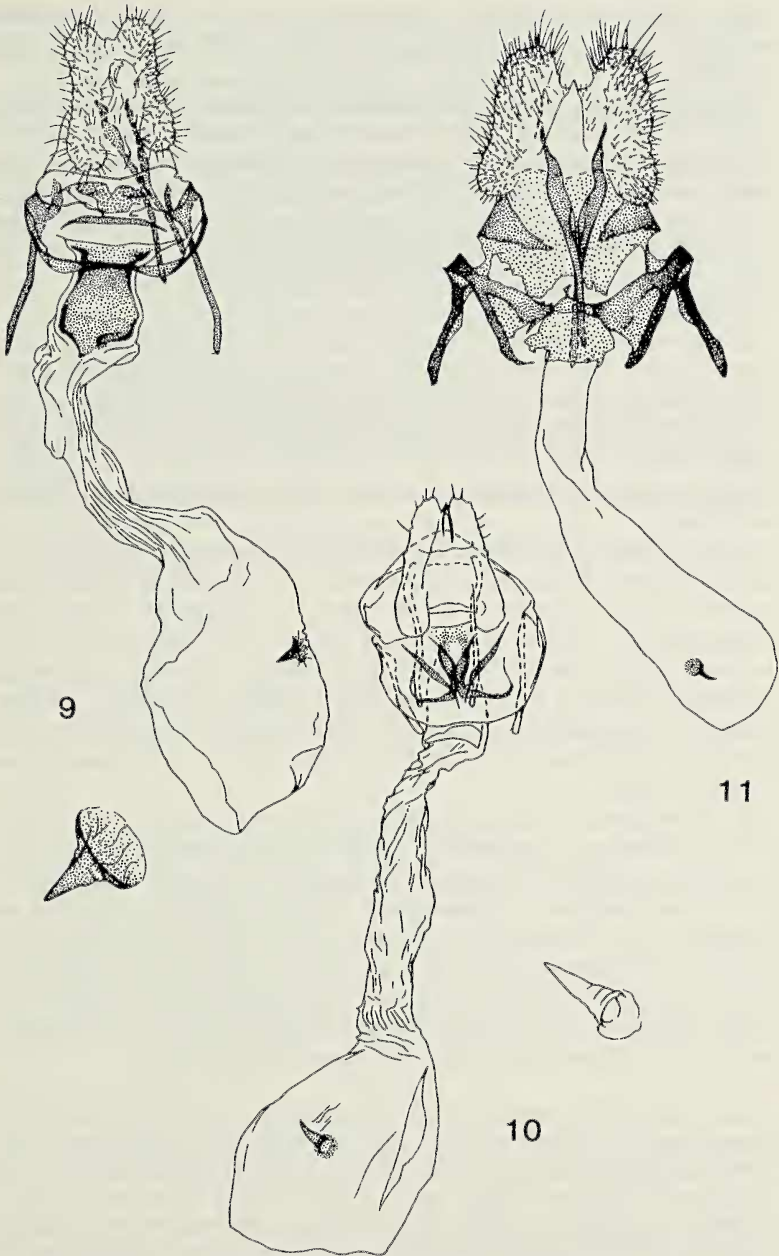
Systematic Relationships

Synnoma lynosyrana is markedly divergent from most Sparganothini in several biological and correlated morphological features (Powell, 1976). The genitalia, however, are characteristic of typical members of the tribe. The male of *S. lynosyrana* is similar to *Platynota*, differing by having sclerotized gnathos arms which are enlarged, paddle-like distally (fig. 8, drawn from JAP prep. no. 3085, Frazier Park, CA, 10 preparations examined). The female genitalia, excepting the enormous colleterial glands, are like many *Sparganothis* and *Platynota* (fig. 11, drawn RL prep. 545, Douglas, AZ, 15 preparations examined). Each of the new genera displays aspects of divergence from the usual sparganothine pattern, and in some respects they bridge the gap formerly separating *Niasoma* from other members of the tribe.

Synalocha (fig. 6) shows sparganothine affinities primarily in the free gnathos arms, but differs by having reduced socii, the vinculum joined only by a membranous band anteriorly, and by the flared aedeagus distally. *Syllonoma* (fig. 7) is still more aberrant for the tribe, having a deeply cleft uncus, extremely reduced socii, and a large flap-like transtilla. Its loss of socii and flared aedeagus appear to show relationships to *Synalocha* and to *Niasoma* (figured by Busck, 1940; 3 JAP preps. examined). The uncus, transtilla and sacculus ridge crossing the valva in *Syllonoma* are unlike any known corresponding characters in other sparganothine genera. Females of the four genera are more conservative, as is true throughout the tribe, and each shows marked modifications of the sterigma and associated structures, with a relatively undifferentiated ductus bursae (figs. 9-11; Busck, 1940).

The wing venation is quite similar in all four genera (fig. 1).

Larvae identified as those of *Synalocha gutierreziae* were collected and sent to me by D. R. Edwards, although associated, reared adults from the same locality were not provided (5 mi S. Kermit, Winkler Co., TX, 9-8-82, DRE 108-07, on *Gutierrezia*). Larvae of *Niasoma metallicana* were obtained from D. H. Habeck, along with reared adults (Edgecliffe, Alachua Co., FL, VIII-17-82, reared from *Eupatorium capillifolium*, R. Weston & J. Gillmore, DHH rearing A3116d). These were compared to larval characters of *Synnoma lynosyrana*, using the description by MacKay



Figs. 9-11. Female genitalia, ventral aspect: 9, *Synalocha gutierreziae* Powell; 10, *Syllonoma longipalpata* Powell; 11, *Synnoma lynosyrana* (Wism.).

(1962) (Calif. and Montana specimens) and larval specimens from northern California and Nevada (JAP 58H3, 73H8, see Powell, 1976 for data).

All three genera match the diagnostic characters of Sparganothini defined by MacKay (1962): On the head, seta P_1 is closer to P_2 than to Adf_2 , with P_1 at the apex of an obtuse angle formed with the other two setae; the V_1 setae on abdominal segment 9 are distinctly farther apart than those on A8 and usually A7. *Niasoma* has P_1 closer to P_2 than in the other genera, a stronger sparganothine tendency but has V_1 's of A9 and A7 equidistant, a weaker indication of affinity with the tribe (i.e. more Archipini-like).

Niasoma also has ocelli I, II, and VI smaller than III and IV, has slightly larger spiracles than does *Synnoma*, and has D and SD pinacula of the mesothorax elongated posteriorly. These are features more characteristic of typical sparganothines and some Archipini than of *Synnoma*. Both *Niasoma* and *Synalocha* differ from *Synnoma* in having the anal shield distinctly triangulate posteriorly and seta SD_1 on A8 directly anterior to the spiracle.

On the basis of the resemblance of *N. metallicana* to *Synalocha gutierreziae* and *Syllonoma longipalpana* in several genital features and particularly the adherence of the larvae to diagnostic features of Sparganothini, I regard *Niasoma* and the two new genera as aberrant members of this tribe. Both Walsingham (1895) on the basis of external characters and wing venation, and Busck (1940), on genitalia, treated *Niasoma* as sparganothine. Lambert (1950), however, excluded it from the tribe, and Obraztsov (in MS) regarded *Niasoma* as representing a monobasic tribe.

The three species of this group for which larval foodplants are known feed on Asteraceae (Compositae). The four genera of moths appear to be derived forms relative to typical Sparganothini and generalized Archipini. Thus, radiation of Asteraceae, a family generally regarded as derived by plant evolutionists, appears to have set the stage for speciation in this line of Tortricinae. This is in accordance with my hypothesis that major lines of Lepidoptera evolved with ecological horizons rather than major angiosperm taxa, and only lesser, derived taxa have developed in association with particular orders of plants (Powell, 1980).

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